



# Discover Engineering

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**Operations Engineer**

**NASA Dryden Flight Research Center**

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## Class of 1999



U.S. AIR FORCE  
**R·O·T·C**








**“Scientists discover the world that exists;  
Engineers create the world that never was.”**

-Theodore Von Karman,  
Aerospace Engineer

**Scientist vs. Engineer**

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The science, skill, and profession of  
acquiring and applying scientific, economic, social,  
and practical knowledge,  
in order to design and build structures, machines,  
devices, systems, materials and processes.

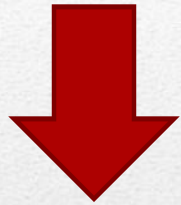
-Wikipedia

# **Engineering**

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# Aeronautics & Astronautics



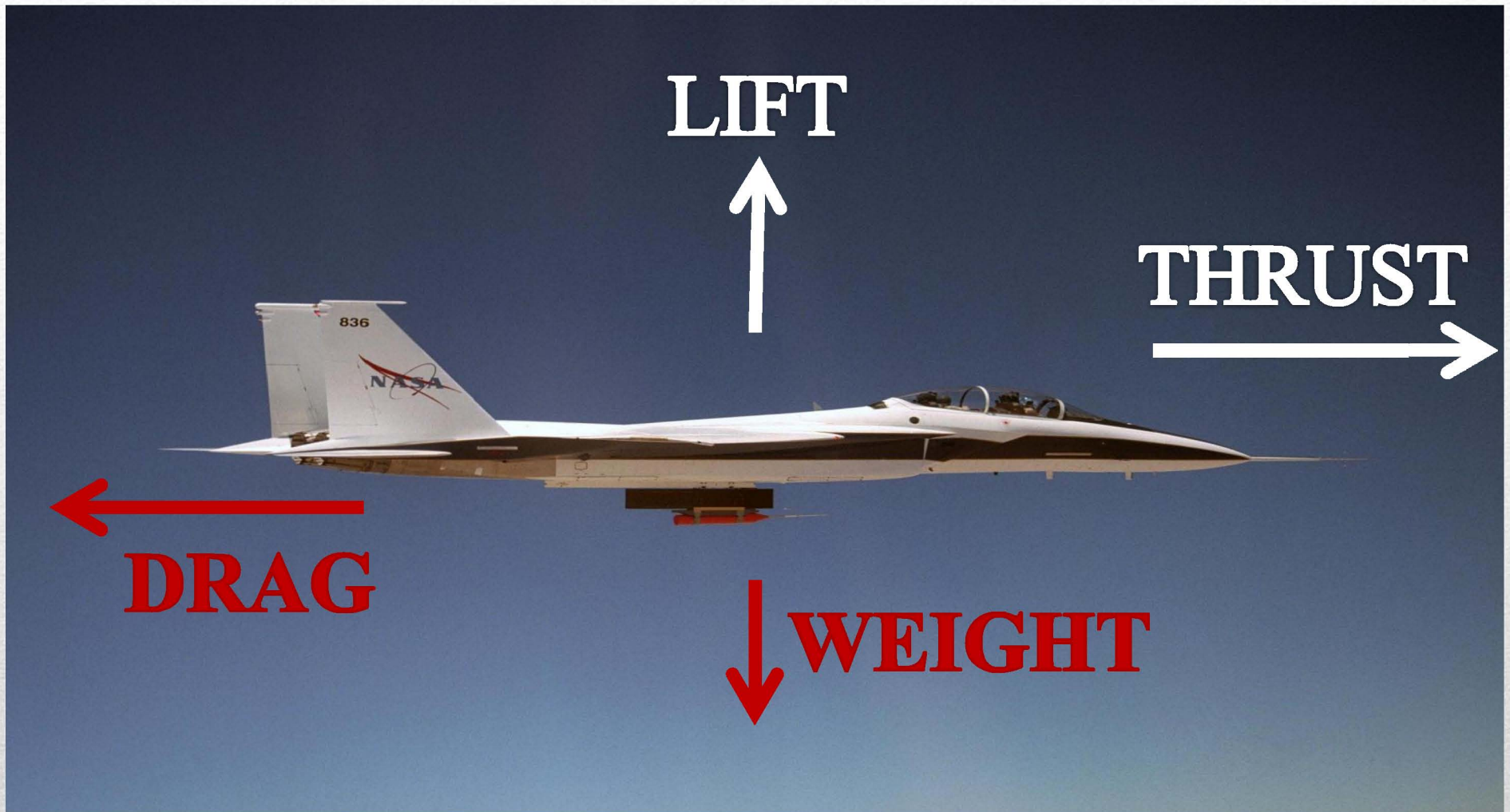
The way air  
moves around  
objects



Navigation  
beyond Earth's  
atmosphere

## **Aerospace Engineering**

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# Science of Flight – 4 Forces

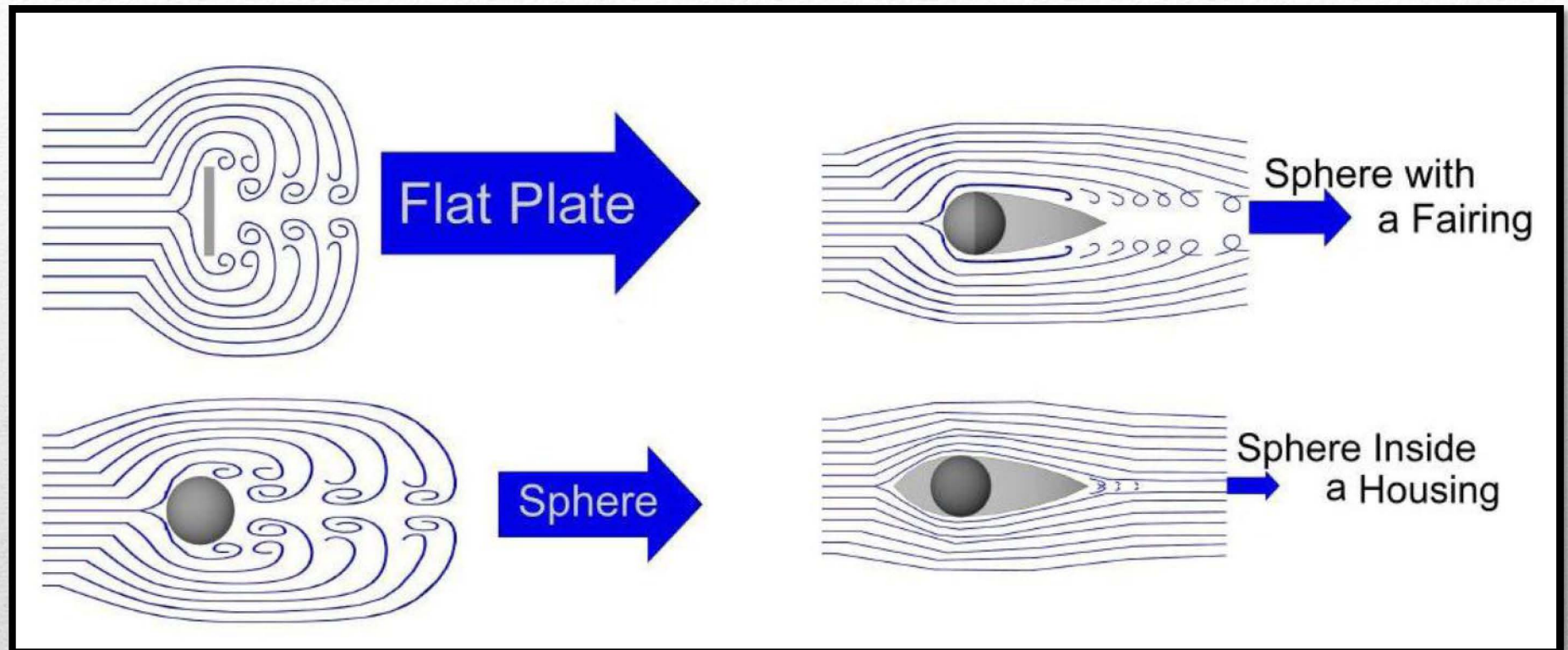




The force on the object due to gravity

# **Science of Weight**

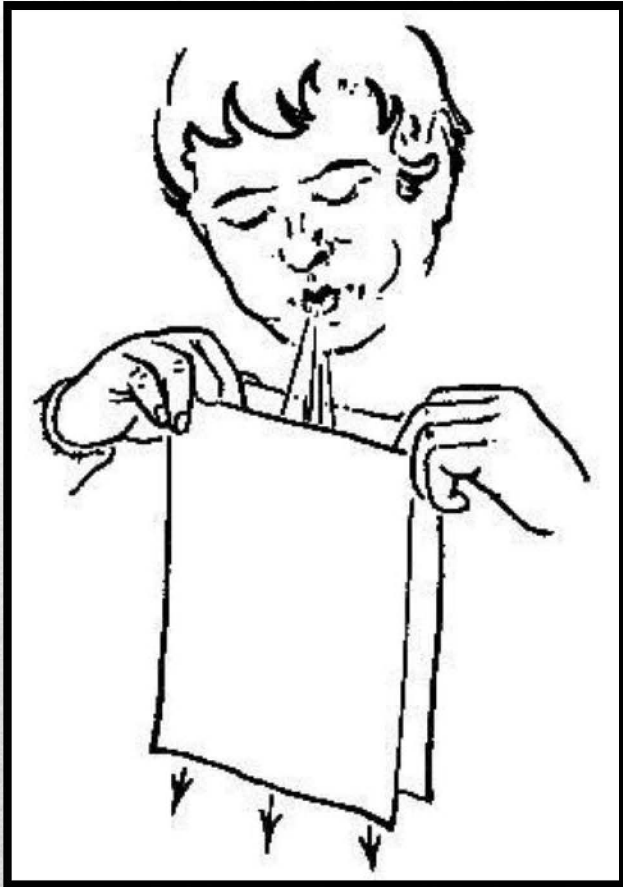
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# Science of Drag

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**Will the papers move  
apart or toward each  
other?**

**Demonstration**

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**Increase in speed =  
Decrease in pressure**

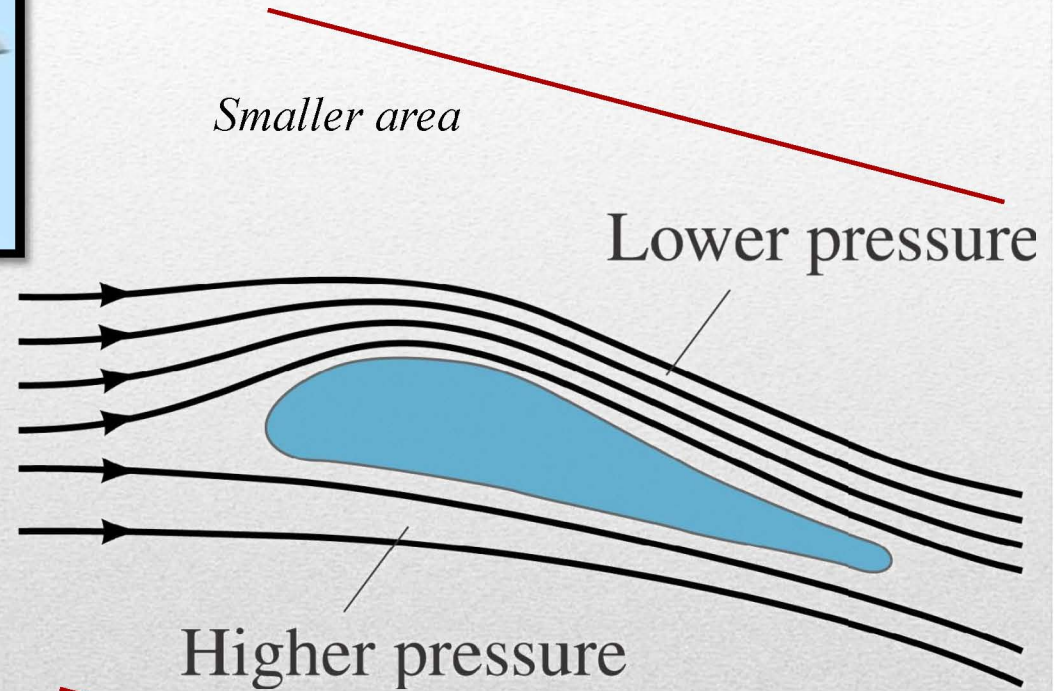
**Derived from  
Conservation of Energy**

**\*Bernoulli's Principle**

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*\*some constraints apply*





# Science of Lift

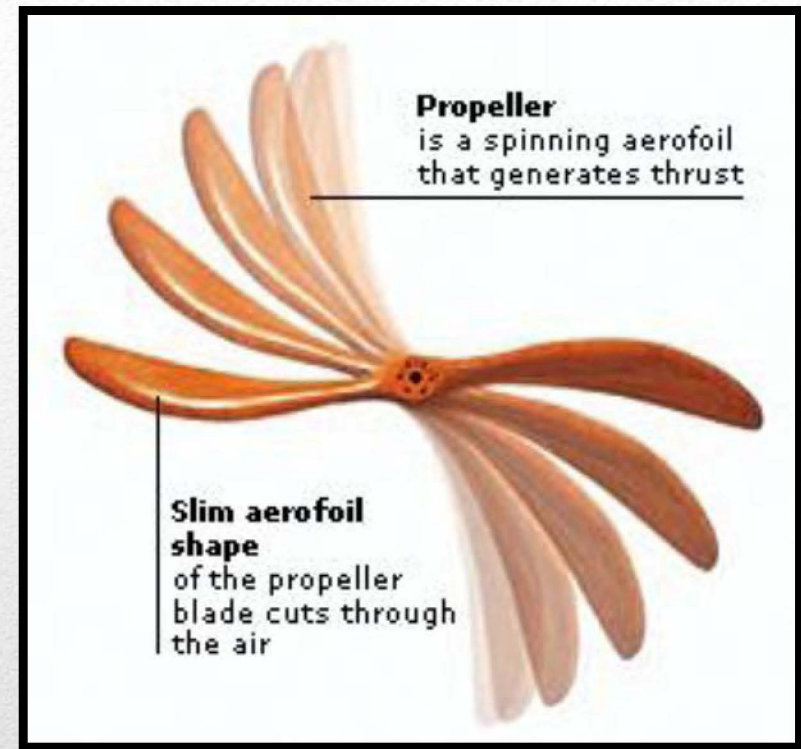
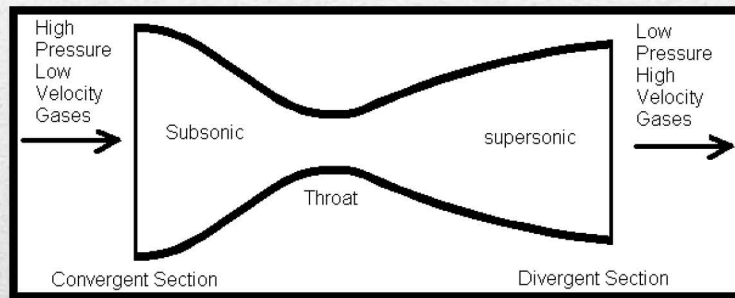
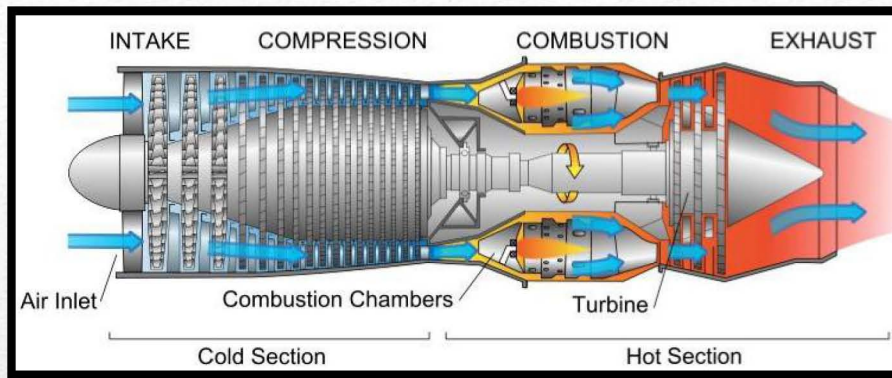
**What is the  
reaction when  
blowing over the  
top of a piece of  
paper?**



**Demonstration**

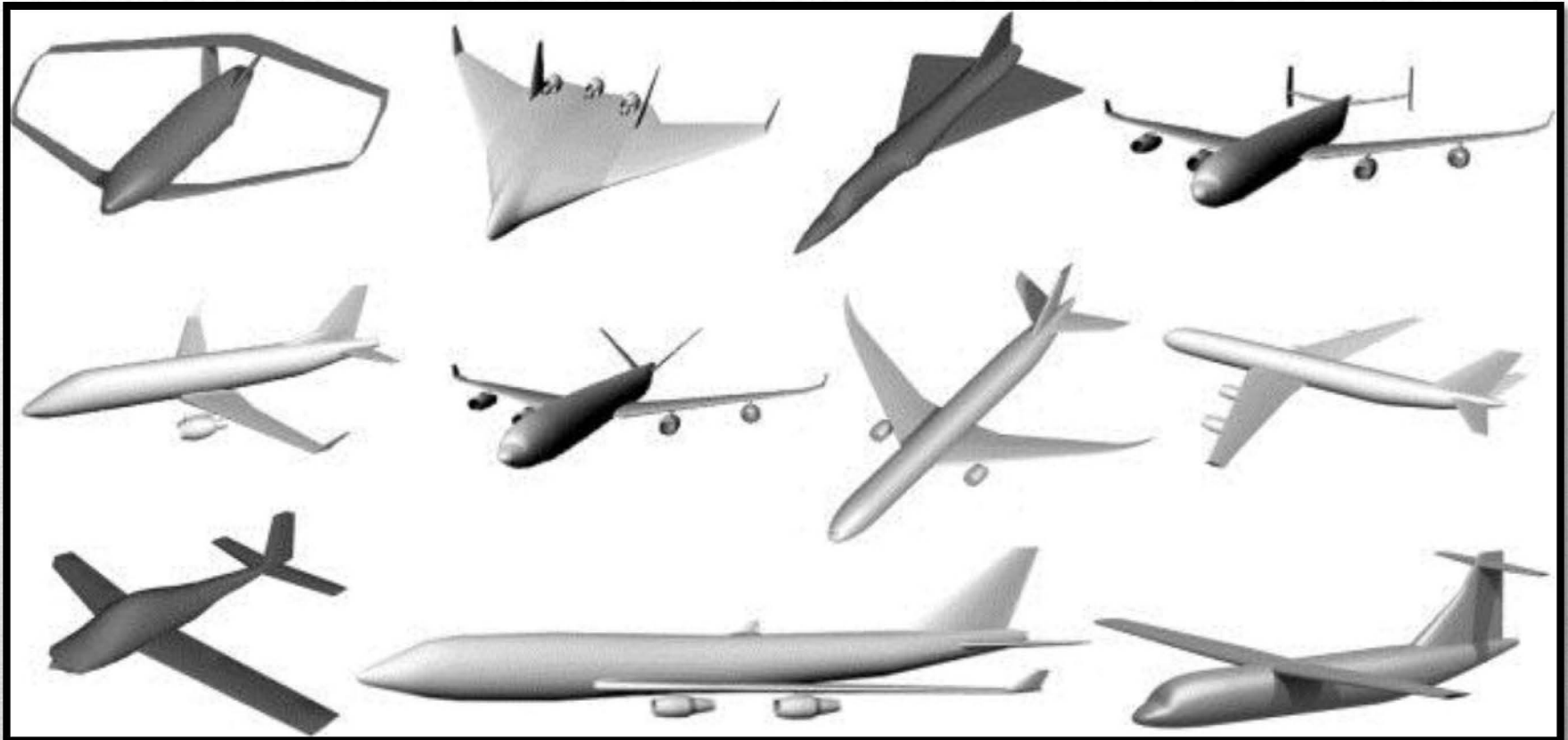
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Propulsion system to overcome drag

# Science of Thrust



**Science → Engineering**

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**Shuttle Carrier**



**Bell X-1**



**North American X-15**



**Space Shuttle**



# Science → Engineering

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- 1) Investigate new design concepts**
  - 2) Find and fix aircraft design problems**
  - 3) Demonstrate levels of performance**

# **FLIGHT TEST ENGINEERING**





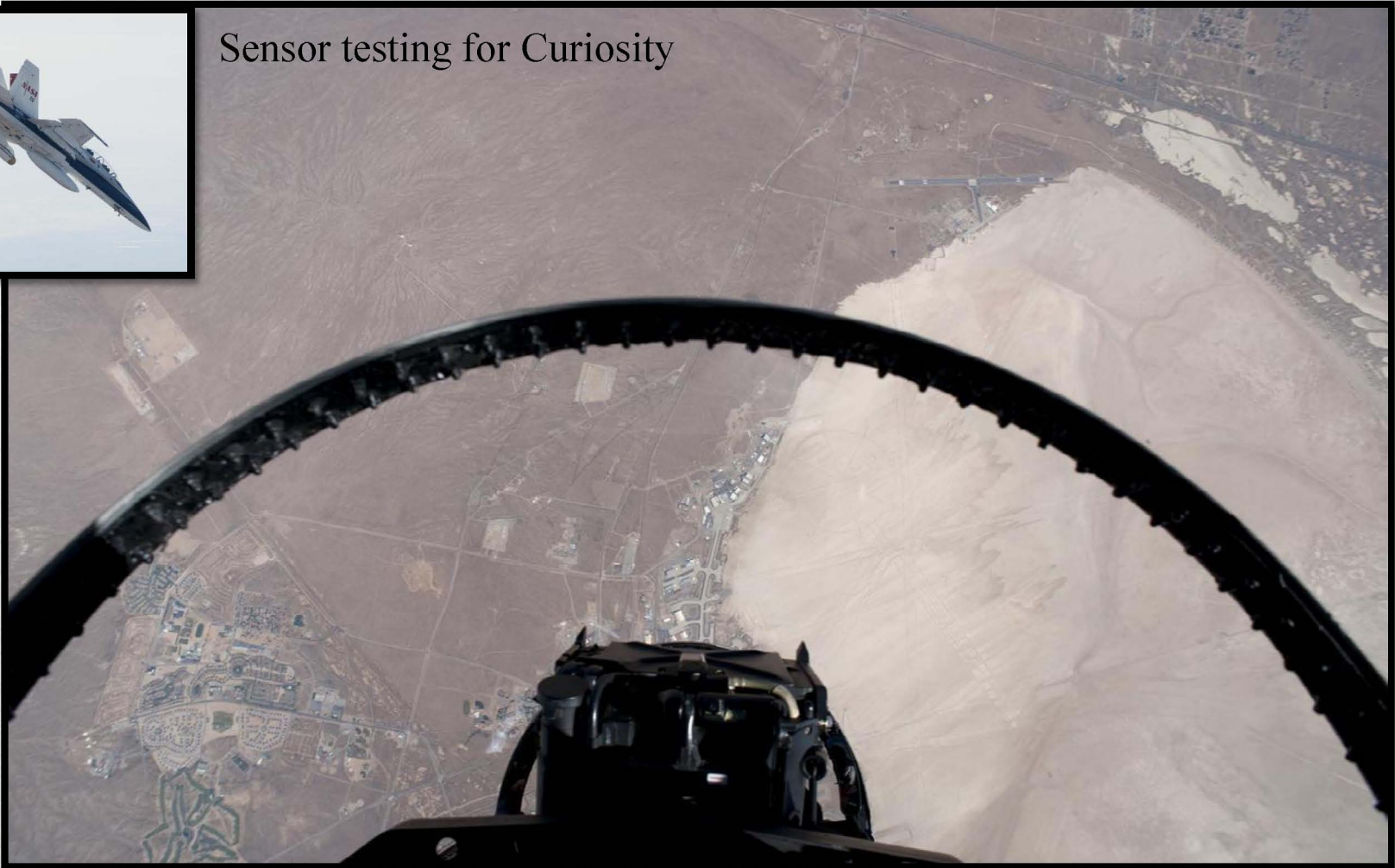
# **Flight Test Nation - Edwards**

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Sensor testing for Curiosity

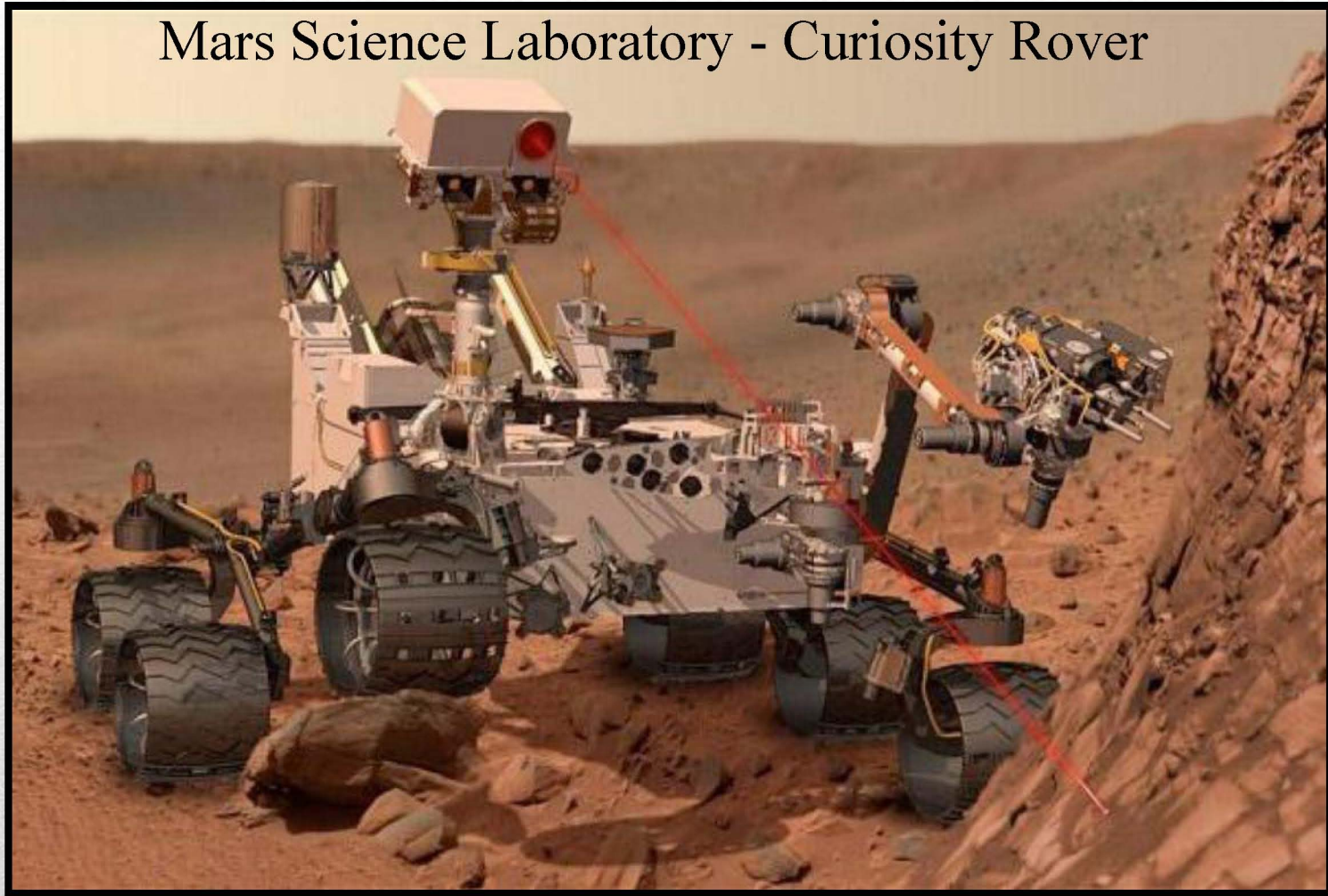


# Flight Test Supporting Space

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Mars Science Laboratory - Curiosity Rover



# Engineering in Space

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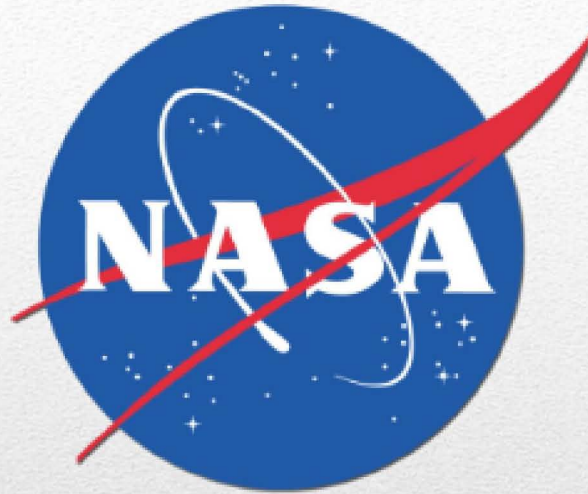


# Dare Mighty Things

**Video - “7 Mins of Terror”**

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**National Aeronautics  
and Space Administration**

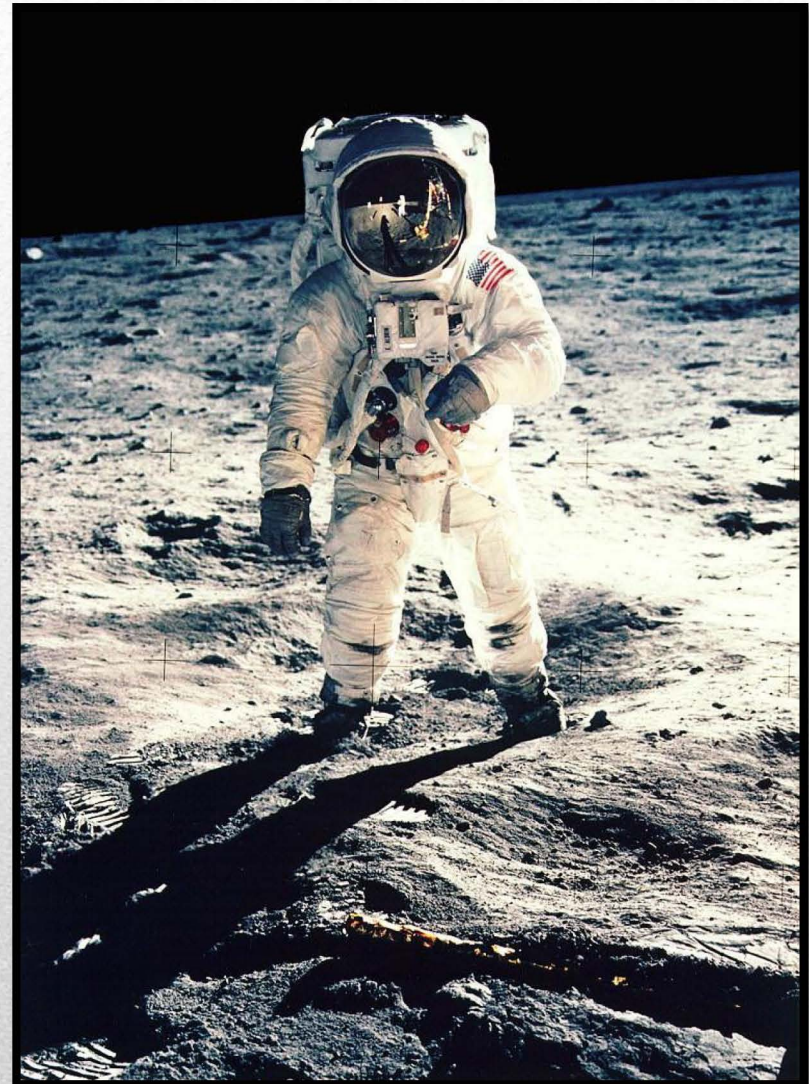
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To reach for new  
heights and reveal  
the unknown so that  
what we do and  
learn will *benefit all  
humankind*

**NASA Vision**

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6,300 patents with US government to date



*Invisible braces*  
*Scratch resistant lenses*  
*Ear thermometer*



*Long distance telecommunications*  
*Cordless tools*  
*Water filters*  
*Etc!*



**NASA In Your Life**

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# Dryden Flight Research Center



## **Primer Flight Test for NASA**





**“We Turn Ideas Into Reality”**

**Video – NASA Dryden**

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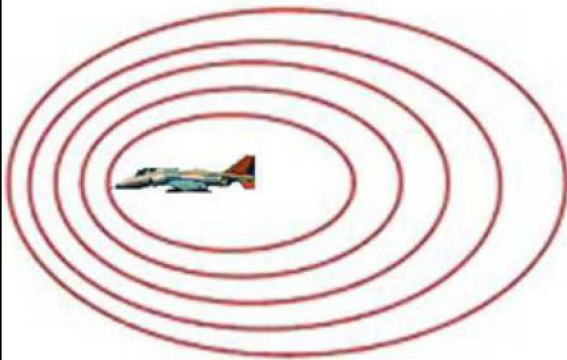
**What are your ideas?**

**Air Travel Improvements**

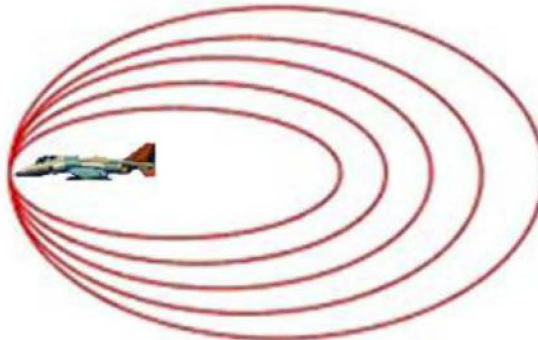
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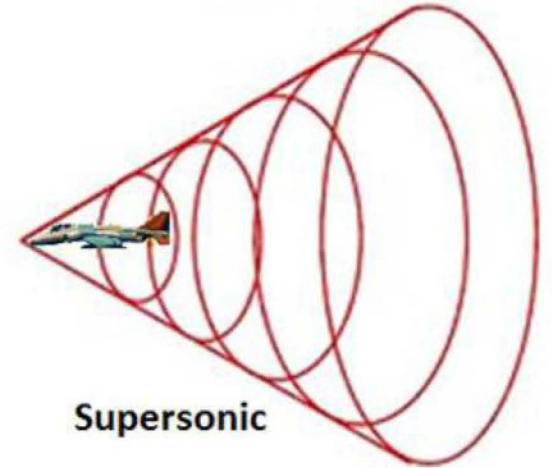
Stationary wave



Subsonic



Sonic



Supersonic

# Science of Sound Waves

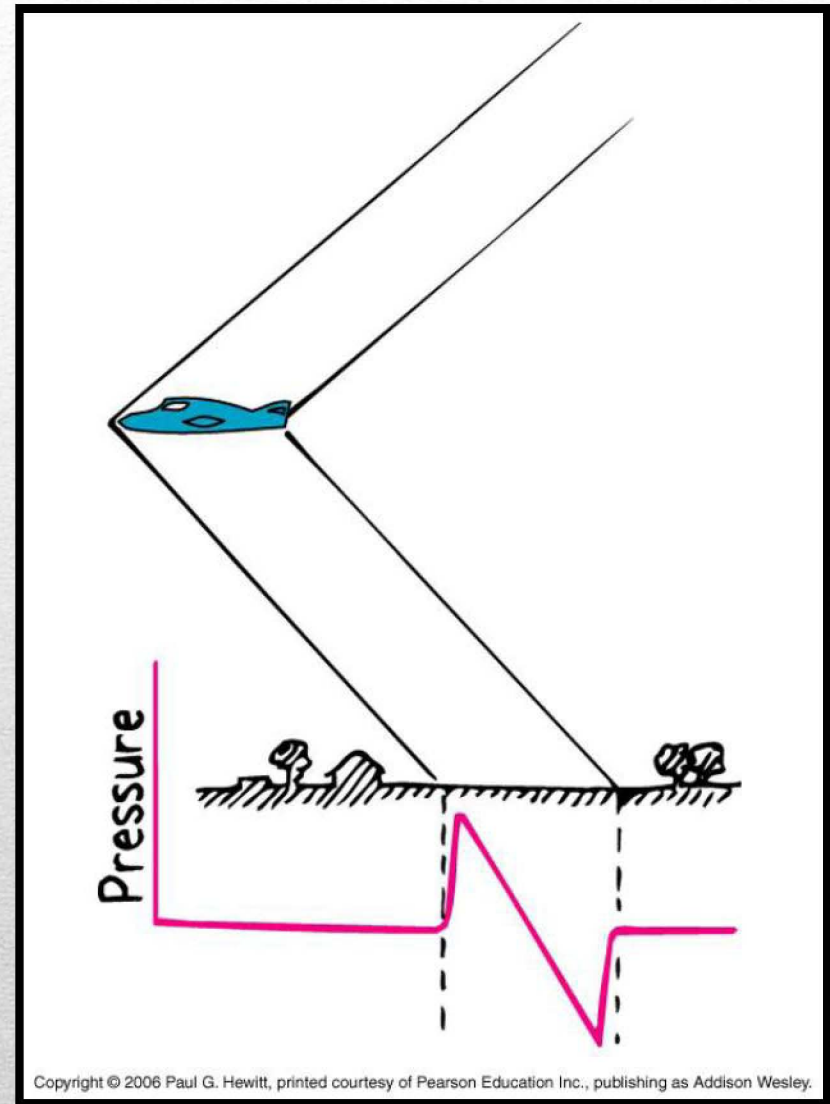
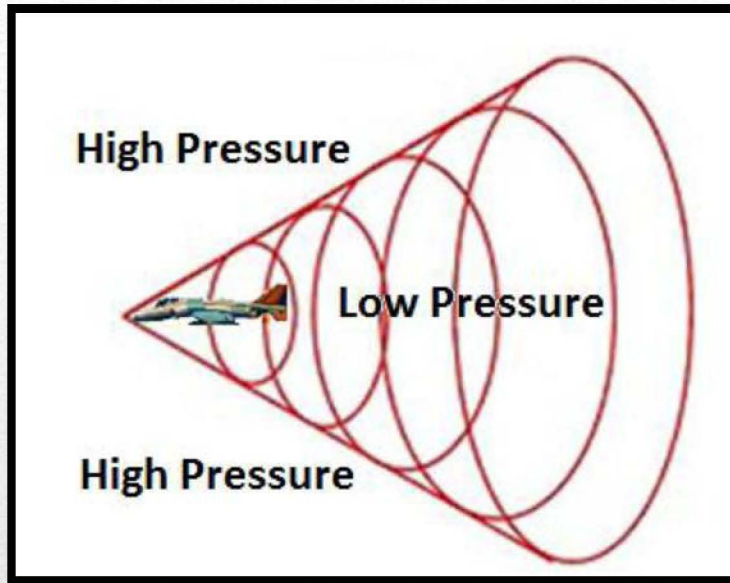
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# Shock Waves

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# Sonic Booms



# Quiet Spike

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**What skills are needed in  
Engineering?**

**Engineering Skills**

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- Agricultural
- Biomedical
- Ceramic and Materials
- Chemical
- Civil
- Computer
- Electrical
- Environmental
- Industrial
- Marine & Ocean
- Mechanical
- Nuclear
- Petroleum
- MORE!

## **Other Types of Engineering**



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Neil Armstrong &  
Lt Kate Pavlock

# Questions?

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